NORTH TOMER BUTTE (PWS 2290010)
SOURCE WATER ASSESSMENT FINAL REPORT

April 2, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated source water assessment area and sensitivity factors associated with the well and aquifer characteristics.

This report, *Source Water Assessment for North Tomer Butte, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The North Tomer Butte drinking water system consists of two active groundwater wells, Woodland #2 and Eastman #3. The system currently serves approximately 259 people through 88 connections.

Final susceptibility scores are derived from equally weighing system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential Contaminants/Land Uses are divided into four categories, inorganic contaminants (IOCs, i.e. nitrates, arsenic), volatile organic contaminants (VOCs, i.e. petroleum products), synthetic organic contaminants (SOCs, i.e. pesticides), and microbial contaminants (i.e. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

In terms of total susceptibility, the Woodland #2 Well rated moderate for IOCs, VOCs, SOCs, and microbials. System construction and hydrologic sensitivity rated moderate, and land use rated high for IOCs, moderate for VOCs, high for SOCs, and low for microbials.

In terms of total susceptibility, the Eastman #3 Well rated moderate for IOCs, VOCs, SOCs, and microbials. System construction rated moderate, hydrologic sensitivity rated low, and land use rated moderate for IOCs, VOCs, SOCs, and low for microbials.

No VOCs or SOCs have ever been detected in either well. Trace concentrations of the IOCs arsenic, barium, chromium, fluoride, nickel, nitrate, sodium, and selenium have been detected in tested water, but at concentrations significantly below maximum contamination levels (MCLs) as set by the Environmental Protection Agency (EPA). As the North Tomer Butte water system exists within a county of medium nitrogen fertilizer use, high herbicide use, and high agricultural chemical use, nitrate contamination may become a water quality issue. At the present time however, nitrate has been detected at concentrations significantly below the MCL of 10 ppm. Total coliform has had a repeat detection once in April 2000.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the North Tomer Butte, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Actions should be taken to keep a 50-foot radius circle clear of all potential contaminants from around the wellhead. Any contaminant spills within the delineation should be carefully monitored and dealt with. As much of the designated protection areas are outside the direct jurisdiction of the North Tomer Butte, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, the well should maintain sanitary standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus on any drinking water protection plan as the delineation contains some urban and residential land uses. Public education topics could include proper lawn care practices, household hazardous waste disposal methods, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. As there are transportation corridors through the delineation, the Idaho Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Latah Soil and Water Conservation District, and the Natural Resource Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Lewiston Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR NORTH TOMER BUTTE, MOSCOW, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the rankings of this assessment mean.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment is also included.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the EPA to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The local community, based on its own needs and limitations, should determine the decision as to the amount and types of information necessary to develop a drinking water protection program. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The North Tomer Butte drinking water system consists of two active groundwater wells, Woodland #2 and Eastman #3. The system currently serves approximately 259 people through 88 connections.

No VOCs or SOCs have ever been detected in either well. Trace concentrations of the IOCs arsenic, barium, chromium, fluoride, nickel, nitrate, sodium, and selenium have been detected in tested water, but at concentrations significantly below MCLs as set by the EPA. As the North Tomer Butte water system exists within a county of medium nitrogen fertilizer use, high herbicide use, and high agricultural chemical use, nitrate contamination may become a water quality issue. At the present time however, nitrate has been detected at concentrations significantly below the MCL of 10 ppm. Total coliform has had a repeat detection once in April 2000.

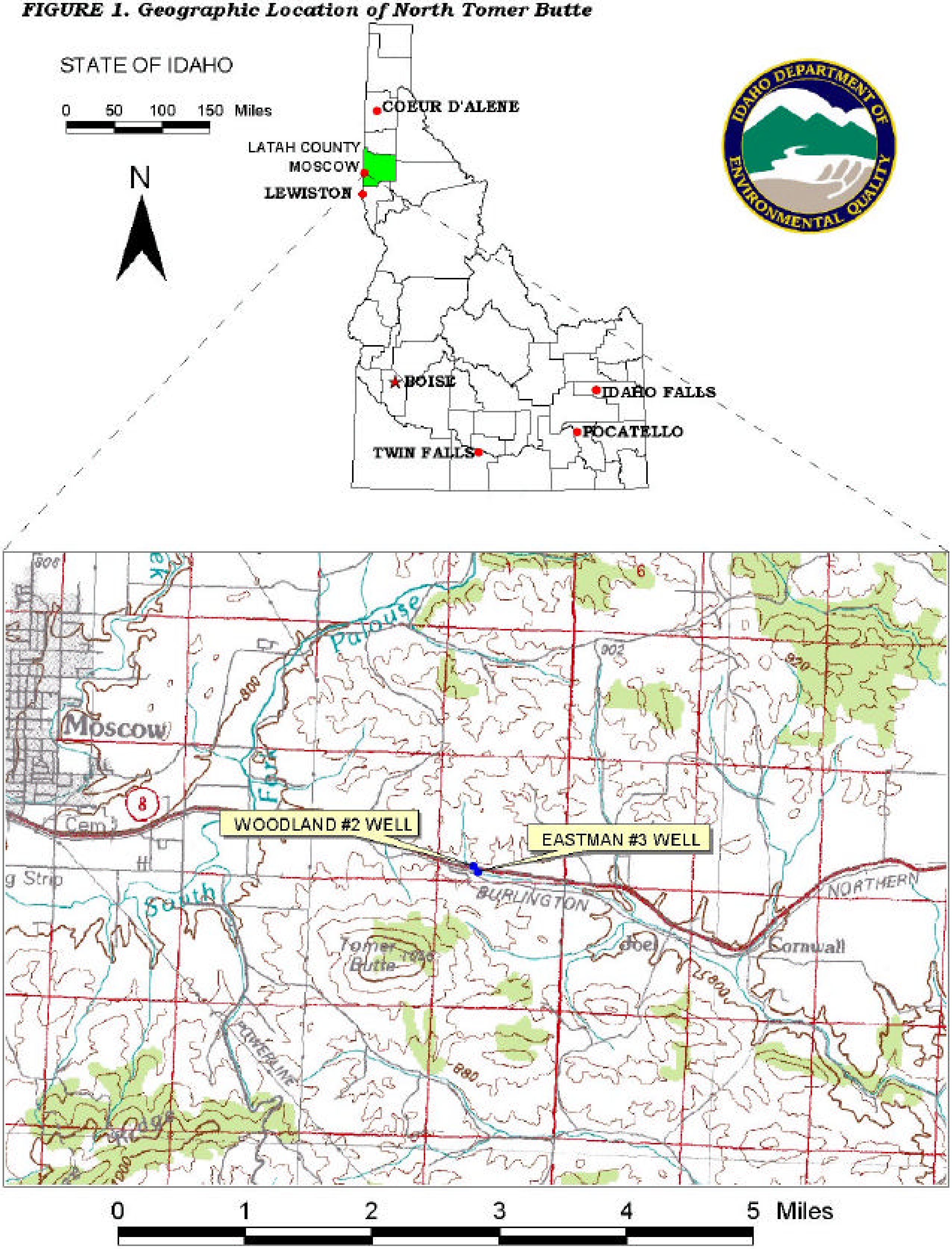
Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ contracted with the University of Idaho to perform the delineations using a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water in the vicinity of the North Tomer Butte wells. The computer model used site specific data, assimilated by the University of Idaho from a variety of sources including operator input, local area well logs, and hydrogeologic reports (detailed below).

Crystalline bedrock of the Palouse Range and associated hills form the boundaries to the north, east, and south of the basalt aquifers of the Moscow-Pullman Basin. Within the Moscow-Pullman basin, the Columbia River Basalt Group and related sedimentary layers form the two major basalt aquifers for the area. The principal rock type comprising the surrounding crystalline bedrock is Cretaceous granite. The other crystalline rock type in the area is metasediments of the much older Precambrian Belt Supergroup. The bedrock geologic maps indicate that this rock type crops out across the street from Country Homes Mobile Home Park (Public Water System No. 290007) and in the vicinity of Tomer Butte. In the Moscow area, the crystalline bedrock is overlain by up to 300 feet of surficial sediments.

Wells located in these crystalline rock units typically produce less than 100 gallons per minute (gpm), compared to 1,000 to 2,000 gpm in the municipal wells that pump from basalt aquifers. Ground water occurrence in the crystalline rock is influenced by weathering at shallow depths and fracturing at deeper depths (Kaal, 1978). Typically, ground water occurs under perched and water table conditions in surficial sediments and weathered bedrock, whereas weathered and fractured granite at deeper depths may contain groundwater under confined conditions (Kaal, 1978). Where unconfined, ground water flow follows topography and is generally less than 10 feet below ground. Water levels in wells tapping the confined crystalline aquifer range from 15 to over 100 feet deep and contouring of static water levels indicates steep and highly irregular gradients (Kaal, 1978).

FIGURE 1. Geographic Location of North Tomer Butte



Because of the variability of ground water occurrence in crystalline rock, and the fact that accurate water levels are not available for the source wells and neighboring test points, a ground water gradient calculated from test points was not used in the WhAEM modeling. Instead, the ground surface topographic gradient was calculated because the water table surface often mimics the surface topography.

The capture zones delineated herein are based upon limited data and must be taken as best estimates. If more data become available in the future these delineations should be adjusted based on additional modeling incorporating the new data.

The delineated source water assessment areas for the Woodland #2 Well can best be described as a northwest trending oblate shape approximately 5 miles long and 2.5 miles wide (Figure 2), and Eastman #3's delineation is a northwest trending corridor approximately 2.5 miles long and 0.3 miles wide (Figure 3). The actual data used by the University of Idaho in determining the source water assessment delineation area is available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of groundwater contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land-use within the immediate area and the surrounding area of the North Tomer Butte wells contains predominantly dryland agriculture, however, Woodland #2's delineation intersects the city of Moscow and contains a high percentage of urban activity in the 6-10 year TOT .

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in August and September 2002. The first phase involved identifying and documenting potential contaminant sources within the North Tomer Butte source water assessment area (Figure 2 and Figure 3) through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area.

The delineated source water assessment areas of the North Tomer Butte wells contains many industrial, consumer and service oriented businesses, especially the delineation for Woodland #2 Well. In addition, Highway 8, Burlington Northern Railroad, and North Fork Palouse River could contribute leachable contaminants to the aquifer in the event of an accidental spill, release, or flood.

Section 3. Susceptibility Analyses

A well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix A contains the susceptibility analysis worksheets for the system. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity rated moderate for both wells. Area soils are poorly to moderately drained, positively affecting the scores. According to well logs for each source, the vadose zone is either soil or decomposing granite and the water table is less than 300 feet deep. Woodland #3 Well does not have an aquitard above its producing zone (mostly decomposing granite), however, Eastman #3 Well does.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced. A sanitary survey was conducted in 2001 for the system.

The Woodland #2 Well rated moderate for system construction. Information from the 1989 Sanitary Survey and the well log noted the following: The well is 230 feet deep and except for the first 15 feet, is 8 inches in diameter. The casing is perforated, but at unknown intervals. An annular seal was placed to 20 feet below ground surface (bgs) with bentonite. The moderate score was derived from the following: The surface seal and wellhead appear to be in good condition, the highest production comes from more than 100 feet below static water depth, and the well is located outside of a 100 year floodplain. Points were added to the rating because the casing and annular seal do not extend into low permeability units and the well does not meet all current construction standards.

The Eastman #3 Well also rated moderate for system construction. Information from the well log noted the following: The well is 775 feet deep and is 8 inches in diameter to 310 feet, 6 inches in diameter to 590 feet, and an open hole to 775 feet. The casing is perforated in three sections, 325 feet bgs to 465 feet bgs, from 505 feet bgs to 525 feet bgs, and from 545 feet bgs to 585 feet bgs. An annular seal of cement was placed to 120 feet bgs. The moderate score was derived from the following: The highest production comes from more than 100 feet below static water depth, the well is located outside of a 100 year floodplain, and the casings and annular seal extend into low permeability units. Points were added to the rating because it is unknown if the surface seal and wellhead are in good condition, and the well does not meet all current construction standards.

Though the well may have been in compliance with standards when they were completed, current PWS well construction standards are more stringent. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. These standards include provisions for well screens, pumping tests, and casing thicknesses to name a few. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. A ten-inch casing requires a thickness of 0.365 inches, an eight-inch casing requires a casing thickness of 0.322 inches, and a 6-inch casing requires a thickness of 0.280 inches. As such, the well was assessed an additional point in the system construction rating.

Potential Contaminant Source and Land Use

The Woodland #2 Well rated high for IOCs (i.e. nitrates, arsenic), moderate for VOCs (i.e. petroleum products, chlorinated solvents), high for SOCs (i.e. pesticides), and low for microbial contaminants (i.e. bacteria). The Eastman #3 Well rated moderate for IOCs, VOCs, and SOCs, and low for microbial contaminants. The number and location of potential contaminant sources within each delineation, the amount of agricultural land within each delineation, and the high county-wide herbicide and agricultural chemical use contributed to the land use scores.

Final Susceptibility Ranking

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, if there are contaminant sources located within 50 feet of the source then the wellhead will automatically get a high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0 to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking.

Table 1. Summary of North Tomer Butte Susceptibility Evaluation

Well	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Woodland #2 Well	M	H	M	H	L	M	M	M	M	M
Eastman #3 Well	M	M	M	M	L	M	M	M	M	M

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

The North Tomer Butte drinking water system consists of two active groundwater wells, Woodland #2 and Eastman #3. The system currently serves approximately 259 people through 88 connections.

In terms of total susceptibility, the Woodland #2 Well rated moderate for IOCs, VOCs, SOCs, and microbials. System construction and hydrologic sensitivity rated moderate, and land use rated high for IOCs, moderate for VOCs, high for SOCs, and low for microbials.

In terms of total susceptibility, the Eastman #3 Well rated moderate for IOCs, VOCs, SOCs, and microbials. System construction rated moderate, hydrologic sensitivity rated low, and land use rated moderate for IOCs, VOCs, SOCs, and low for microbials.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the North Tomer Butte, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. No chemicals should be stored or applied within the 50-foot radius of the wellhead. As much of the designated protection areas are outside the direct jurisdiction of the North Tomer Butte, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, the well should maintain sanitary standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. As there are many houses within the delineation, a strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include proper lawn and garden care practices, hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Lewiston Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Lewiston Regional DEQ Office (208) 799-4370

State DEQ Office (208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper, mlharper@idahoruralwater.com, Idaho Rural Water Association, at 208-343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

Bush, J.H., Provant, A.P., and Gill, S.W.; 1998; Bedrock geologic map of the Moscow West Quadrangle, Latah County, Idaho and Whitman County, Washington; Idaho Geological Survey GM-23.

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Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

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Appendix A

Potential Contaminant Inventory and Land Use Tables

and

Delineation Figures

Table 2. North Tomer Butte, Well #1 Big Meadow, Potential Contaminant Inventory and Land Use

Site	Description of Source[1]	TOT[2] Zone	Source of Information	Potential Contaminants[3]
1	UST Site, open	3 YR	Database Search	VOC, SOC
2	Farm Supplies (Wholesale)	3 YR	Database Search	IOC, VOC, SOC
3	Garbage Collection	3 YR	Database Search	IOC, VOC, SOC, Microbials
4	Trucking	3 YR	Database Search	IOC, VOC, SOC
5	Fish Hatcheries	6 YR	Database Search	IOC, SOC
6	Nursery	6 YR	Database Search	IOC, SOC
7	Tree Service	6 YR	Database Search	IOC, VOC, SOC
8	Janitor Service	6 YR	Database Search	IOC, VOC, SOC
9	General Contractors	6 YR	Database Search	IOC, VOC, SOC
10	Taxidermists	6 YR	Database Search	VOC, SOC
11	Taxicabs	6 YR	Database Search	IOC, VOC, SOC
12	Taxidermists	6 YR	Database Search	VOC, SOC, Microbials
13	Building Contractors	6 YR	Database Search	IOC, VOC, SOC
14, 16, 23	State Government; UST Site, closed; LUST Site, cleanup completed, impact unknown; LUST Site, cleanup incomplete, impact unknown	10 YR	Database Search	VOC, SOC
15, 18, 36	Automobile Dealers-New Cars; closed UST; LUST, cleanup completed, groundwater impact	10 YR	Database Search	VOC, SOC
17	LUST Site, Cleanup Completed, Impact: groundwater	10 YR	Database Search	VOC, SOC
19	UST Site, closed	10 YR	Database Search	VOC, SOC
20, 56	Service Stations-Gasoline & Oil; UST Site, open	10 YR	Database Search	VOC, SOC
21	UST Site, State Government; closed	10 YR	Database Search	VOC, SOC
22	UST Site,closed	10 YR	Database Search	VOC, SOC
24	UST Site, Petroleum Distributor; closed	10 YR	Database Search	VOC, SOC
25	UST Site, Gas Station; open	10 YR	Database Search	VOC, SOC
26, 93	Automobile Repairing & Service; UST Site, open	10 YR	Database Search	VOC, SOC
27, 51, 112, 123	Chemicals (Wholesale); RCRA Site; UST Site, closed; SARA Site	10 YR	Database Search	VOC, SOC
28	UST Site, Local Government; closed	10 YR	Database Search	VOC, SOC
29	UST Site, Auto Dealership; closed	10 YR	Database Search	VOC, SOC
30, 99	Service Stations-Gasoline & Oil; UST Site, open	10 YR	Database Search	VOC, SOC
31	UST Site, Not Listed; closed	10 YR	Database Search	VOC, SOC
32	Oils-Lubricating-Wholesale	10 YR	Database Search	IOC, VOC, SOC
33	Automobile Body-Repairing & Painting	10 YR	Database Search	IOC, VOC, SOC
34	Service Stations-Gasoline & Oil	10 YR	Database Search	IOC, VOC, SOC
35	Buses-Charter & Rental	10 YR	Database Search	VOC, SOC
37	Veterinarians	10 YR	Database Search	IOC, SOC
38	Photographers-Portrait	10 YR	Database Search	IOC, VOC
39	Wineries	10 YR	Database Search	IOC, SOC
40	Publishers-Book	10 YR	Database Search	IOC, VOC
41	General Contractors	10 YR	Database Search	IOC, VOC, SOC
42	Veterinarians	10 YR	Database Search	IOC, SOC
43	Screen Printing	10 YR	Database Search	IOC, VOC
44	Wallpapers & Wallcoverings	10 YR	Database Search	IOC, VOC, SOC

Site	Description of Source[1]	TOT[2] Zone	Source of Information	Potential Contaminants[3]
45, 111, 122	Seeds & Bulbs-Wholesale; SARA Site; RCRA Site	10 YR	Database Search	IOC, SOC
46	Signs (Manufacturers)	10 YR	Database Search	IOC, VOC, SOC
47	Fertilizing Equipment-Manufacturer	10 YR	Database Search	IOC, VOC, SOC
48	Automobile Electric Service	10 YR	Database Search	IOC, VOC, SOC
49	Janitor Service	10 YR	Database Search	IOC, VOC, SOC
50	Logging Companies	10 YR	Database Search	IOC, VOC, SOC
52	Veterinarians	10 YR	Database Search	IOC, SOC
53	Veterinarians	10 YR	Database Search	IOC, SOC
54, 66	Veterinarians	10 YR	Database Search	IOC, SOC
55	Storage-Household & Commercial	10 YR	Database Search	IOC, VOC, SOC
57, 113	Cleaners; RCRA Site	10 YR	Database Search	IOC, VOC, SOC
58	General Contractors	10 YR	Database Search	IOC, VOC, SOC
59	Photographers-Commercial	10 YR	Database Search	IOC, VOC
60	Printers	10 YR	Database Search	IOC, VOC
61, 115	Automobile Lubrication Service; RCRA Site	10 YR	Database Search	IOC, VOC, SOC
62	Automobile Radiator-Repairing	10 YR	Database Search	IOC, VOC, SOC
63	General Contractors	10 YR	Database Search	IOC, VOC, SOC
64	Printers	10 YR	Database Search	IOC, VOC
65	Taxidermists	10 YR	Database Search	VOC, SOC
67	Trucking-Heavy Hauling	10 YR	Database Search	IOC, VOC, SOC
68	Tire-Dealers-Retail	10 YR	Database Search	IOC, VOC, SOC
69	Veterinarians	10 YR	Database Search	IOC, SOC
70	Automobile Repairing & Service	10 YR	Database Search	IOC, VOC, SOC
71	Car Washing & Polishing	10 YR	Database Search	IOC, VOC, SOC
72	Carpet & Rug Cleaners	10 YR	Database Search	IOC, VOC, SOC
73	Floor Laying Refinishing & Resurfacing	10 YR	Database Search	IOC, VOC, SOC
74	Fire Departments	10 YR	Database Search	VOC, SOC
75	Dried/Dehydrated Fruits/Vegetables	10 YR	Database Search	VOC, SOC
76	Water Treatment Equip Service & Supplies	10 YR	Database Search	IOC, VOC, SOC
77	Storage-Household & Commercial	10 YR	Database Search	IOC, VOC, SOC
78	Transit Lines	10 YR	Database Search	IOC, VOC, SOC
79	Recreational Vehicles-Repairing	10 YR	Database Search	IOC, VOC, SOC
80	Car Washing & Polishing	10 YR	Database Search	IOC, VOC, SOC
81	Storage-Household & Commercial	10 YR	Database Search	IOC, VOC, SOC
82	Publishers-Periodical	10 YR	Database Search	IOC, VOC
83	Automobile Parts & Supplies-Retail	10 YR	Database Search	IOC, VOC
84, 85	State Government-National Security	10 YR	Database Search	IOC, VOC, SOC
86	Bus Lines	10 YR	Database Search	IOC, VOC, SOC
87	Bicycles-Dealers	10 YR	Database Search	IOC, VOC, SOC
88	Automobile Dealers-New Cars	10 YR	Database Search	IOC, VOC, SOC
89	Janitor Service	10 YR	Database Search	IOC, VOC, SOC
90	Lawn Mowers-Sharpening & Repairing	10 YR	Database Search	IOC, VOC, SOC
91	Publishers-Book	10 YR	Database Search	IOC, VOC
92	Printers	10 YR	Database Search	IOC, VOC
94	Seeds & Bulbs-Wholesale	10 YR	Database Search	IOC, SOC
95	Photographers-Portrait	10 YR	Database Search	IOC, VOC
96	General Contractors	10 YR	Database Search	IOC, VOC, SOC

Site	Description of Source[1]	TOT[2] Zone	Source of Information	Potential Contaminants[3]
97	General Contractors	10 YR	Database Search	IOC, VOC, SOC
98	Funeral Directors	10 YR	Database Search	IOC, VOC, SOC
100, 119	Seeds & Bulbs-Wholesale; SARA Site	10 YR	Database Search	IOC, SOC
101	Transmissions-Automobile	10 YR	Database Search	IOC, VOC, SOC
102	General Contractors	10 YR	Database Search	IOC, VOC, SOC
103	Automobile Repairing & Service	10 YR	Database Search	IOC, VOC, SOC
104	Government-Forestry Services	10 YR	Database Search	IOC, VOC, SOC
105	Federal Government-National Security	10 YR	Database Search	IOC, VOC, SOC
106	Electric Companies	10 YR	Database Search	IOC, VOC, SOC
107	Publishers-Art	10 YR	Database Search	IOC, VOC
108	Automobile Body-Repairing & Painting	10 YR	Database Search	IOC, VOC, SOC
109	Automobile Parts & Supplies-Retail	10 YR	Database Search	IOC, VOC, SOC
110, 121	Air & Water Research & Solid Waste Management, SARA Site, RCRA Site	10 YR	Database Search	IOC, VOC, SOC
114	RCRA Site	10 YR	Database Search	IOC, VOC, SOC
116	RCRA Site	10 YR	Database Search	IOC, VOC, SOC
117	RCRA Site	10 YR	Database Search	IOC, VOC, SOC
118	RCRA Site	10 YR	Database Search	IOC, VOC, SOC
120	SARA Site	10 YR	Database Search	IOC, VOC, SOC
124	SARA Site	10 YR	Database Search	IOC, VOC, SOC
125	WLAP Site	10 YR	Database Search	IOC, SOC
	Burlington Northern Railroad	0-10 YR	GIS Map	IOC, VOC, SOC, Microbials
	Highway %$#$@#$%	0-10 YR	GIS Map	IOC, VOC, SOC, Microbials
	South Fork Palouse River	0-10 YR	GIS Map	IOC, VOC, SOC, Microbials

[1] UST = Underground Storage Tank, LUST = Leaking Underground Storage Tank, RCRA = Resource Conservation Recovery Act, SARA = Superfund Amendments Recovery Act, WLAP = Waste Land Application ,
[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead
[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Fig. 2

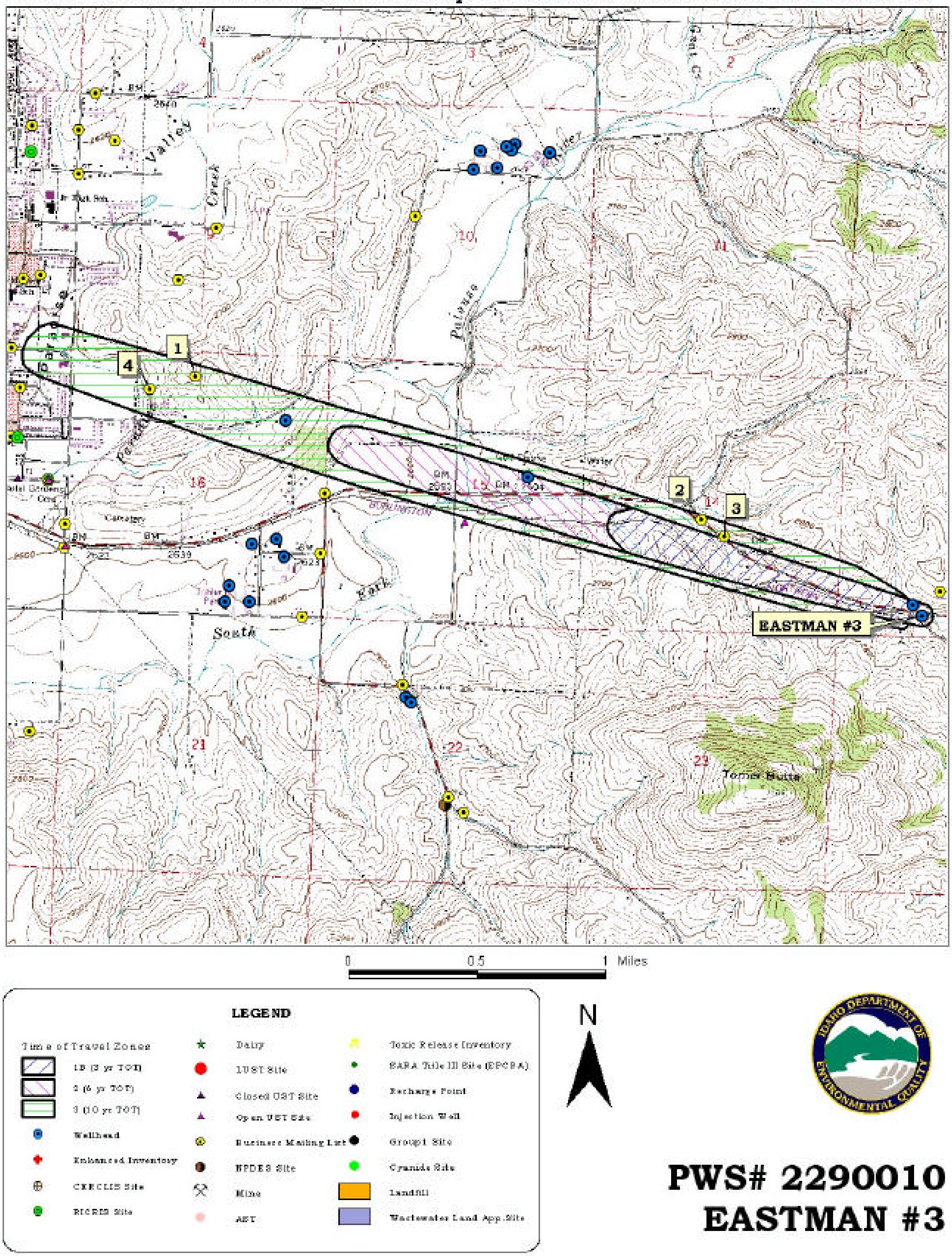
Table 3. North Tomer Butte, Eastman #3 Well, Potential Contaminant Inventory and Land Use

Site	Description of Source	TOT[1] Zone	Source of Information	Potential Contaminants[2]
1	Fish Hatchery	10 YR	Database Search	IOC, SOC
2	Garbage Collection	10 YR	Database Search	IOC, VOC, SOC
3	Trucking	10 YR	Database Search	IOC, VOC, SOC
4	Taxicab	10 YR	Database Search	IOC, VOC, SOC, Microbials

[1] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[2] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

FIGURE 3. North Tomer Butte Delineation Map and Potential Contaminant Source Locations



PWS# 2290010
EASTMAN #3

Appendix B

North Tomer Butte Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report   Public Water System Name :
TROY CITY OF   Well# : WELL #1 BIG ME
Public Water System Number 2290010   11/01/2002 12:42:32 PM

1. System Construction		SCORE			
Drill Date	08/27/1973				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	1990			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
	Total System Construction Score	4			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	YES	0			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
	Total Hydrologic Score	4			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
	Total Potential Contaminant Source/Land Use Score - Zone 1A	2	0	2	0
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	3	3	3	2
(Score = # Sources X 2) 8 Points Maximum		6	6	6	4
Sources of Class II or III leacheable contaminants or	YES	6	2	2	
4 Points Maximum		4	2	2	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural Land	4	4	4	4
	Total Potential Contaminant Source / Land Use Score - Zone 1B	14	12	12	8
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	25 to 50% Irrigated Agricultural Land	1	1	1	
	Potential Contaminant Source / Land Use Score - Zone II	4	4	4	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
	Total Potential Contaminant Source / Land Use Score - Zone III	2	2	2	0
Cumulative Potential Contaminant / Land Use Score		22	18	20	8

4. Final Susceptibility Source Score	12	12	12	11
5. Final Well Ranking	Moderate	Moderate	Moderate	Moderate

Ground Water Susceptibility Report   Public Water System Name :
TROY CITY OF   Well# : DUTHIE PARK
Public Water System Number 2290010   11/01/2002 11:12:31 AM

1. System Construction

		SCORE
Drill Date	01/27/1993	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1990
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	NO	1
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		4

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		1

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	0	2	0

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	2	2	2	1
(Score = # Sources X 2) 8 Points Maximum		4	4	4	2
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		5	5	5	2

Potential Contaminant / Land Use - ZONE II

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	25 to 50% Irrigated Agricultural Land	1	1	1	
Potential Contaminant Source / Land Use Score - Zone II		2	1	1	0

Potential Contaminant / Land Use - ZONE III

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		0	0	0	0
Cumulative Potential Contaminant / Land Use Score		9	6	8	2

4. Final Susceptibility Source Score	7	6	7	6
5. Final Well Ranking	Moderate	Moderate	Moderate	Moderate